

method in which TiO₂ layers are initially synthesized and later placed on the substrate.

[0042] “Preparation of TiO₂ coatings on PET monoliths for the photocatalytic elimination of trichloroethylene in the gas phase” Sanchez, B.; Coronado, J. M.; Caudal, R.; Pórtela, R.; Tejedor, I.; Anderson, M. A.; Tompkins, D.; Lee, T. Appl. Catal. B-Environ. 2006, 66, 295) Appl. Catal. B, 2006, 66(3-4): 295. When referring to obtaining TiO₂ coatings using previously synthesized nanoparticles by a layer-by-layer deposition.

DESCRIPTION OF THE INVENTION

[0043] The invention procedure is a preparation procedure of a gel-coat with a base of synthetic curable resin additivated with titanium dioxide and alumina particles. This new material, developed in contact with the volatile organic composites which form the environmental pollution in large cities, allows to photocatalytically deactivate NO_x in presence of ultraviolet light. The material's preparation method has far softer preparation conditions regarding the curing, the temperature conditions and the necessary solvents, than standard preparation methods of this type of gel-coat.

[0044] The fields of application of coatings with this new type of based materials are numerous, ranging from new types of coatings in construction materials, urban items and transport vehicle bodies which allow to photocatalytically deactivate NO_x in large cities, to the development of coatings for vessel surfaces which allow to avoid the attachment of sea life to hull vessels due to their biocidal effects.

[0045] The necessary steps in order to develop pieces through this new type of material are the following:

Mould Preparation

[0046] Moulds must be placed in a suitable environment (clean, without volatile particles in the air), with a temperature and humidity suitable for work, and checking that the temperature of the initial gel-coat is between 18-25° C. before its use.

Gel-Coat Preparation

[0047] The gel-coat must be homogenized and, when utilized, only the previously estimated amount will be used for each mould. In the event of mould preparation with different gel-coat batches, they must be properly homogenized before their use, in order to avoid differences in their physical-chemical properties. For gel-coats of accelerated curing, before its use a 50% catalyst solution will be added, in order to achieve between 1.5 and 3.5% of the catalyst of the final weight of the mixture. For gel-coats of non-accelerated curing, before its use a 2% solution will be added, so that after having added it to the gel-coat, a 0.5-1.5% proportion is achieved. Subsequently, the catalyst will be added in the same conditions as in the aforementioned case. It must be reminded that excessive agitation may leave air in the composition and cause a lamination with micropores in the film of the cured gel-coat.

[0048] Thus, homogenization must be meticulously carried out in order to avoid bubble appearance.

Gel-Coat Additivation with Titanium Dioxide and Alumina Particles

[0049] In the gel-coat, an initial additivation of between 1 and 25% of TiO₂ (in anatase and rutile metastable phases) must be produced in the final weight of the mixture, addi-

tivated in powder with a granulometry lower than 20 nanometres of particle width. Afterwards, it will be additivated with Al₂O₃ in powder, also with a granulometry lower than 20 nanometres of particle width, in quantities between 5 and 25% of the final weight of the material. A perfect homogenization must be achieved through mechanical agitation no higher than 500 rpm for at least 15 minutes.

Application of the Gel-Coat with Additives.

[0050] The gel-coat must be normally applied on the predefined mould in the previous steps, in optimal standard working conditions for its application (avoid excessive humidity and temperature working conditions for its application).

BRIEF DESCRIPTION OF THE DRAWINGS

[0051] FIG. 1.—Flowchart diagram of the process with the minimum steps required in order to be able to manufacture this new type of additivated material with TiO₂ and Al₂O₃

PREFERRED EMBODIMENT OF THE INVENTION

[0052] The new material obtained has direct application in the construction field, transport by road, rail, air or sea, as well as in the environment in general, as this type of material has several fundamental properties: photocatalytic properties in order to decompose NO_x, self-cleaning, biocidal and deodorizing properties, all of which require the presence of air and ultraviolet light.

[0053] The invention herein additionally illustrates the preparation methods and fields of application through the following examples without intending to limit the scope of the invention.

Example 1. Preparation of Gel-Coat in Moulds with Polyester-Based Resins which do not Require Acceleration in Order to be Cured. See FIG. 1

[0054] Moulds must be placed in a suitable environment (clean, without volatile particles in the air), with a temperature and humidity suitable for work, and checking that the temperature of the initial gel-coat is between 18-25° C. before its use. The base resin must be homogenized and, when utilized, only the previously estimated amount must be used for each mould. In the event of different resin batches, all of them must be properly homogenized before their use, in order to avoid differences in their physical-chemical properties. A catalyst solution will be added so that it achieves 2% in the mixture. This addition will be carefully performed. It must be taken into consideration that excessive agitation may leave air in the composition and cause a lamination with micropores in the film of the cured gel-coat. Thus, homogenization must be meticulously carried out in order to avoid bubble appearance. Afterwards, an initial additivation of 2% of TiO₂ will be added to the base resin in the final weight of the mixture, additivated in powder with a granulometry lower than 20 nanometres of particle width. Afterwards, it will be additivated with Al₂O₃ in powder, also with a granulometry lower than 20 nanometres of particle width, in an amount of 6% of the final weight of the material. A perfect homogenization must be achieved through mechanical agitation no higher than 500 rpm for at least 15 minutes. Then, the gel-coat composition must be applied on the predefined mould in the previous steps in a